EIGHTH QUIZ

You have 15 minutes from the start of class to complete this quiz. Read the questions with care; work with deliberate speed. Don't give us more than we ask for. The usual instructions apply. Good luck!

Problem 1 (8 points)

Suppose we have book structures defined as follows:

```
(define-struct book (title author genre price sold instock))
```

Complete the definition of this function, using one symbol per blank.

```
;; author-sales: string list-of-book -> number
;; Return the total income from all books on the list whose author matches the
;; first input.
(define author-sales
  (lambda (name LOB)
    (cond
      ((_____ LOB) _____)


      ((_____  _____ (_____ (_____ LOB)))


        (_____ (* (_____ (_____ LOB))


                            (_____ (_____ LOB)))


           (_____ name (_____ LOB))))


        (else (_____ _____ (_____ LOB))))))))
```


Problem 2 (7 points)

Below is a definition of `collection-change` from the restaurant collection program. It could be used just as well to search for a collection of books; we've just changed "rrant" to "book" in the contract and purpose:

```
;; collection-change: collection (book->boolean) (book->book) -> collection
;; Return a collection made up of all the books in C, except that
;; those that pass test? are changed by action.
(define collection-change
  (lambda (C test? action)
     (map (lambda (b) (cond ((test? b) (action b)) (else b))) C)))
```

[Continued on the next page]

Complete the definition below by completing the two lambda expressions. More than one item will be necessary for each blank, but the answers aren't long. Use `raise-book-price`; you don't have to define it yourself.

```
;; raise-book-price: book number -> book
;; Return the book with the number added to its price.
;; raise-genre-prices: symbol number list-of-book -> list-of-book
;; Increase the price of every book of the specified genre by the specified amount.
(define raise-genre-prices
  (lambda (genre amount LOB)
    (collection-change LOB
                       (lambda (X) _____ )


                       (lambda (Y) _____ )
```

Problem 3 (9 points)

A Deus X reference sheet is attached. You may tear it off; you don't have to turn it back in. We'll have a better chance of assigning you partial credit if you show your work (e.g., draw a picture of the register(s) and/or memory locations).

(a) (3 points) Suppose that location 3333 of the Deus X machine's memory holds the number 50 and that location 8888 holds the number 40. What is in location 8888 after executing these three instructions? (The first number on each line indicates the instruction's address in memory.)

```
0.  10  3333    (lda 3333)
1.   1  8888    (add 8888)
2.  20  8888    (sta 8888)
```

(b) (4 points) Suppose that location 7777 of the Deus X machine's memory holds the word PEAR, that location 8888 holds the word PLUM, and that location 9999 holds the word PEAR. What does the Deus X machine print after executing these instructions?

```
0.  10  7777    (lda 7777)
1.  50  9999    (cmpa 9999)
2.  60     5    (je 5)
3.   6  9999    (out 9999)
4.   7     6    (jmp 6)
5.   6  8888    (out 8888)
6.     …
```

(c) (2 points) Which of the following operations would you expect to see as a single machine-language instruction on a typical computer (like the Deus X)? (Choose *one or more* of the following.)

A. Resize a window when the user drags the window's corner.

B. Divide one number by another.

C. Compute the average of two numbers.

D. Compare text stored in two memory locations to see whether one is greater than the other.

E. Change a pixel so that its amount of blue is half of its previous blue value.